

## **SAFETY SEAT WITH DEVICE FOR AUTOMATICALLY PUTTING A BELT ON AND TAKING IT OFF**

### **Background of the Invention**

5           The present invention relates to a safety seat, for land, air and  
sea vehicles, having at least one seat portion and one back rest,  
wherein the safety seat can be secured in the vehicle, between the  
floor and the ceiling area thereof, by means of securement straps that  
are provided above and below the seat, and wherein the safety seat is  
provided with a safety belt harness for securing the occupant that is  
10           sitting on the safety seat.

          A safety seat having the aforementioned features is known from  
DE 43 03 719 A1; the safety seat is embodied as a fabric or textile  
shell that surrounds not only the back of the occupant's body but also  
the sides, and which has an entry portion. To secure the occupant  
15           sitting in the safety seat, a safety belt harness is provided that closes  
off the entry region and is comprised of four individual safety belts that  
are combined in a central belt buckle.

          The known safety seat has the drawback that the putting-on of  
the safety belt harness is complicated, since a plurality of belts must be  
20           hooked into the central belt buckle. Furthermore, when the belts are  
taken off they rest in the textile shell, so that when the occupant enters  
the seat, he or she may sit upon the belts and can then grasp them

only with difficulty for the strapping-in process. This is particularly significant if the safety seat is to be used in military vehicles, because in this case the occupant is frequently burdened with cumbersome clothing and equipment, thus significantly limiting the freedom of movement of the occupant after entry into the safety seat.

It is therefore an object of the present invention to provide a safety seat having the aforementioned features, according to which the freedom of movement of an occupant is increased, and in particular putting-on and taking-off of the safety belt harness is simplified.

#### Brief Description of the Drawings

This object, and other objects and advantages of the present invention, will appear more clearly from the following specification in conjunction with the accompanying schematic drawings, in which:

Fig. 1 shows a safety seat with the safety belt harness in the taken-off position;

Fig. 2 shows the safety seat with the safety belt harness illustrated in the strapped-on position;

Fig. 3 shows the safety seat of Fig. 1 in another embodiment with automatic tensioning devices for tensioning and shoulder belts, with the safety belt harness in the taken-off position; and

Fig. 4 shows the safety seat of Fig. 3 with the safety belt harness in the snapped-in position.

#### Summary of the Invention

5 The basic concept of the present invention is that the safety belt harness comprises two lap belts that are each secured laterally of the seat portion and can be connected to one another by means of a belt buckle comprising a buckle body and an insertion tongue, as well as two shoulder belts that extend from the lap belts and are adapted to extend over the shoulders of the occupant, and an activating means  
10 that, as an extension of the shoulder belts, is guided below the seat portion to the entry region thereof; respective tensioning straps are yieldingly disposed between the shoulder belts, and front ones of the securement straps that extend on both sides of the entry region of the safety seat, in such a way that when the safety belt harness is not  
15 strapped on, the shoulder straps are held, under prestress, in an orientation that is parallel to the front securement straps.

The present invention has the advantage that due to the configuration of the safety belt harness with respectively two lap belts as well as two shoulder belts a lateral support as with the state of the  
20 art is no longer necessarily required, and the safety seat is reduced to a design having a seat portion and a back rest, whereby the safety seat is still secured in the vehicle with securement straps that are disposed

in the front entry region and in the rear back rest region respectively above and below the safety seat. Since when the safety belt harness is taken off the shoulder straps are held by the tensioning straps in an orientation that extends parallel to the upper, front securement straps of the safety seat, and due to the connection of the shoulder belts with the lap belts also the lap belts are held in a plane that is disposed laterally of the seat portion, the entry region for the safety seat is left free, thus precluding the occupant from sitting upon parts of the safety belt harness upon entry. To strap the harness on, the occupant need only grasp the parts of the belt buckle held on the front securement straps and join them together in front of his or her body, as a result of which on the one hand when the belt buckle is closed the lap belts are disposed in front of the occupant's body, and on the other hand also the shoulder straps that are connected with the lap belts automatically position themselves accompanied by yielding of the tensioning straps. The shoulder belts are tightened by the furthermore provided activating means that end in front of the occupant in the entry region.

Pursuant to one embodiment of the invention, in the region of the back rest of the safety seat the shoulder straps are combined to form a central back belt, and the activating means, which is embodied as an activating belt, is connected with the back belt.

5                   With regard to a better adaptation of the safety belt harness to  
the proportions of an occupant, pursuant to one embodiment of the  
invention, the buckle body and the insertion tongue of the belt buckle  
secured to the ends of the lap belts are respectively connected with the  
seat portion of the safety seat by means of an adjustment strap, the  
length of which can be altered; by adjusting the adjustment straps after  
the safety belt harness has been strapped on, the position of the belt  
buckle in front of the body of the occupant can be corrected, thus  
adapting the position of the individual components of the safety belt  
harness to the body of the occupant.

10                   Pursuant to a first embodiment of the invention, the tensioning  
straps are made of a resiliently yielding material, and their ends are  
respectively fixedly secured to the securement straps and the shoulder  
belts, whereby pursuant to one embodiment the tensioning straps are  
preferably made of rubber.

15                   With regard to the arresting of the activating belt after tightening  
of the shoulder belts, pursuant to one embodiment of the invention a  
releasable securing device is disposed on the seat portion in the entry  
region for fixing the activating belt in position.

20                   Alternatively, the tensioning straps can be secured to the  
shoulder belts and, via belt deflection means disposed on the front and  
rear securement straps of the safety seat, can be guided to an

automatic tensioning device disposed in the region of the back rest. In a similar manner, the shoulder belts or the rear belt can be connected to a tensioning device disposed in the region of the back rest. To the extent that with this embodiment of the invention an automatic  
5 tensioning device is provided, this tensioning device can be embodied as a known belt reel-in device that is provided with a winding spring as well as with a reversible blocking mechanism.

Pursuant to one embodiment of the invention, the activating means engages both belt reel-in devices in such a way that a  
10 respective oppositely directed rotational movement of the belt reel-in shafts is activated; this ensures that by an unwinding from the associated belt reel-in device, the tensioning straps, which are connected with the shoulder belts, are lengthened by the amount in which the shoulder belts are tightened. In this connection, it can be  
15 provided that the belt reel-in devices are coupled with one another via a common shaft that the activating means engages, whereby mechanisms are known that despite a central shaft permit an oppositely directed rotational movement within the belt reel-in devices.

Pursuant to one embodiment of the invention, the activating  
20 means is embodied as an activating belt that engages the central shaft of the belt reel-in devices and that in turn can be wound onto the central shaft.

Alternatively, an appropriately designed activating means can engage the blocking mechanism of the belt reel-in devices and, by activation of the blocking mechanism, can respectively introduce or release the winding movement or the unwinding movement, respectively under the effect of associating springs. In this connection, it can be provided that the activating means be embodied as a Bowden cable having a switch lever disposed on the seat portion so that by activating the switch lever, the tensioning of the shoulder belts including the release of the tensioning straps, or the release of the shoulder belts including the tightening of the tensioning straps, can be initiated.

It should be noted that the present invention is not limited to a safety seat having a seat portion and a back rest, but rather the invention can also be used with a design of the safety seat as a textile shell as known from the aforementioned DE 43 03 719 A1.

Further specific features of the present invention will be described in detail subsequently.

#### Description of Preferred Embodiments

Referring now to the drawings in detail, the safety seat illustrated in each of the figures comprises a seat portion 11 and a back rest 12, whereby front securement straps 13 engage the seat portion in the front entry region thereof above and below the seat portion 11, and

respective rear securement straps 14 engage the upper and lower ends of the back rest 12; with these front and rear securement straps, the safety seat 10 can be secured in a non-illustrated land, air or sea vehicle.

5                   The safety belt harness, which is provided for securing an occupant that is sitting on the safety seat, primarily comprises two lap belts 15, one end of which, to the side of the seat portion 11, and in the region of the connection to the back rest 12, is either secured to the vehicle or to the seat portion itself. Secured to the free ends of the lap  
10                   belts 15 are, on the one hand, a buckle body 16 and, on the other hand, an insertion tongue 17, whereby connection of the insertion tongue 17 and the buckle body 16 forms a belt buckle by means of which the lap belts 15 can be closed in front of the body of the occupant.

15                   Secured to the lap belts 15, or to the buckle body 16 and the insertion tongue 17, are two shoulder belts 18 which, from their connection to the lap belts 15, are guided over the shoulders of the occupant to the back rest 12, which they span from the outside; in the illustrated embodiment, the two shoulder belts 18 are joined together in  
20                   a common back belt 19 that merges into an activating belt 20 as an activating means, that is guided below the seat portion 11 toward the front to the entry region of the safety seat 10. Disposed on the free



end of the activating belt 20 is a hand loop 23. Although not illustrated in detail, a clamping or securement device is disposed in the front region of the seat portion 11 through which the activating belt 20 is guided. This securement device makes it possible, after the actuation of the activating or arresting belt 20 for tensioning the shoulder belts 18, to fix the arresting belt 20 in position and hence to maintain the tension in the shoulder belts 18. To release the activating belt, the securement device can be appropriately disengaged. Disposed between the respective shoulder belt 18 and the associated, lateral, front securement strap 13 is a respective fixing or tensioning strap 21 that is made of an elastic material, preferably rubber. The ends of the tensioning strap 21, in the embodiment illustrated in Figs. 1 and 2, are respectively securely connected with the front, upper securement straps 13 and the shoulder belts 18. Furthermore, a respective adjustment strap 22 extends from the lap belts 15, or from the buckle body 16 and the insertion tongue 17, to the front entry region of the seat portion 11.

As can be seen from a comparison of Figs. 1 and 2, to put the belt harness on one proceeds as follows: the occupant seats himself or herself in the safety seat 10, with the safety belt harness disposed as in Fig. 1. To buckle up, the occupant grasps the components of the safety belt buckle, namely the buckle body 16 and the insertion tongue

17, which are disposed to the side in front of him or her and that by the effect of the tensioning straps 21 are disposed on the front securement straps 13, and closes the buckle by inserting the tongue 17 into the buckle body 16. To the extent that by this movement the shoulder belts 18 are guided inwardly, the occupant places his or her arms through the thereby formed loops of the shoulder straps 18 and subsequently pulls on the activating belt 20 by grasping the hand loop 23 disposed in front of him or her. This tensioning movement tightens the shoulder belts 18, and in particular against the effect of the elastic tensioning straps 21. If the shoulder straps 18 are sufficiently tensioned, the activating belt 20 is fixed in position in the non-illustrated securing device. Subsequently, by tightening the adjustment straps 22, the position of the belt buckle can be corrected. Thus, with few manipulations, the strapped-in state of the safety belt harness visible in Fig. 2 can be realized.

To take the safety belt harness off, the occupant releases the activating belt 20 from the securing device and thus disengages the back belt 19 having the connected shoulder belts 18. Subsequently, the occupant opens the belt buckle, and the lap belt 15 as well as the shoulder belts 18 are again brought into the starting position of Fig. 1 by the tensioning straps 21, which are under prestress; in this starting

position, the safety belt harness is ready for the next buckling-up procedure.

5 The embodiment illustrated in Figs. 3 and 4 differs from the previous embodiment illustrated in Figs. 1 and 2 in that the tensioning straps 21 connected to the respective shoulder belts 18, from their securement to the shoulder belts, are guided over belt deflection means 24, which are respectively disposed on the front upper securement straps 13 and the upper rear securement straps 14, to a tensioning device, which is in the form of a known belt reel-in device 10 25, and which is disposed in the region of the back rest 12; the tensioning straps 21, prior to entry into the belt reel-in device 25, are joined together to form a central belt portion 27. In the same manner, the back belt 19, which is connected with the shoulder belts 18, is also guided to a belt-reel device 26, which is in the form of a tensioning 15 device and is disposed in the region of the back rest, so that not only the tensioning straps 21 but also the shoulder straps 18 are under the effect of winding springs disposed in the belt-reel devices 25, 26, and the non-strapped-in position of the safety belt harness illustrated in Fig. 3 is brought about by the retraction action of the belt-reel devices 25, 20 26, while the strapping-in movement up to the strapped-in state illustrated in Fig. 4 is effected against the action of the belt-reel devices 25, 26, i.e. of the winding springs disposed therein. Formed in the

belt-reel devices 25, 26 are blocking mechanisms, which can be controlled or switched in a known manner, for fixing the respective wound-up belt sections of the back belt 19 and the central belt portion 27 of the tensioning straps 21 in position.

5                    In the embodiment illustrated in Figs. 3 and 4, the snapping-in process is accomplished in the same manner as described in connection with Figs. 1 and 2, whereby with the joining together of the lap belts 15 with the shoulder belts 18, the yielding of the tensioning straps 21 is ensured by unwinding the central belt portion from the  
10                    associated belt-reel device 25. After the lap belts 15 have been put on, the activating means, which in the illustrated embodiment is embodied as an activating belt 20, is activated, as a result of which the belt reel-in device 26 that is associated with the shoulder belts 18 is disengaged, so that the shoulder belts 18 tighten. In conformity with the tightening  
15                    of the shoulder belts, the belt reel-in device 25 that is associated with the tensioning straps 21 releases the required amount of belt length.

                    For taking the safety belt harness off, the activating belt 20 is again activated and reverses the blocking mechanism of the belt-reel devices 25, 26 such that now, after the release of the belt buckle  
20                    connection, the belt reel-in device 25 draws the central belt portion 27 in and hence tightens the tensioning straps 21, which thereby again bring the shoulder straps 18 into the starting position illustrated in Fig.

3; the lengthening of the shoulder straps 18 required for this is ensured by an appropriate unwinding movement from the belt reel-in device 26 that is associated with the shoulder straps 18.

5 The specification incorporates by reference the disclosure of priority document DE 102 43 075.6 of 16 September 2002.

The present invention is, of course, in no way restricted to the specific disclosure of the specification and drawings, but also encompasses any modifications within the scope of the appended claims.

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